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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/541,007

06/28/2005

Mark J Childs

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS
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EXAMINER

DEB, ANJAN K

ART UNIT

PAPER NUMBER

2858

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DELIVERY MODE

06/26/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/541,007	Applicant(s) CHILDS, MARK J	
	Examiner Anjan K. Deb	Art Unit 2858	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06/28/2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>03/08/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a) because they fail to show suitable descriptive label in the box 60 and 68 in Fig. 5 as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

In addition to Replacement Sheets containing the corrected drawing figure(s), applicant is required to submit a marked-up copy of each Replacement Sheet including annotations indicating the changes made to the previous version. The marked-up copy must be clearly

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labeled as "Annotated Sheets" and must be presented in the amendment or remarks section that explains the change(s) to the drawings. See 37 CFR 1.121(d)(1). Failure to timely submit the proposed drawing and marked-up copy will result in the abandonment of the application.

Specification

2. The disclosure is objected to because of the following informalities: Layout of the specification does not conform to preferred layout for the specification of a utility application for US Patent. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino

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acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-5, 7, 8, 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Busse et al. (US 6,653,636 B2) in view of Kozlowski (US 6,417,504 B1).

Re claims 1 and 14, Busse et al. disclosed apparatus and method of measuring light intensity of an image to be detected using a plurality of light sensor elements 10 each forming a pixel of an image sensor, a sensor voltage across the elements 1 varying depending on the light incident on the elements, comprising amplifying the sensor voltage using an in-pixel voltage amplifier 22,23 having a gain, charging a sampling capacitor 26 with the amplified voltage and measuring 30,31,11 the flow of charge required to charge the sampling capacitor 26.

Busse et al. did not expressly disclose wherein the voltage amplifier has a gain greater than 1.

Kozlowski disclosed readout circuit for an image sensor wherein amplifier provides a minimum voltage gain from 10 to 30 (column 5 lines 22-24) to mitigate the reductions in

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transimpedance resulting from either short integration time or large capacitance (column 6 lines 58-60).

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Busse et al. by including amplifier having gain greater than 1 disclosed by Kozlowski to mitigate the reductions in transimpedance resulting from either short integration time or large capacitance.

Re claim 2, Busse et al. disclosed a pixel storage capacitor 2 connected to the light sensor element 1 (column 6 lines 27-31).

Re claims 3, 4, 7, 8, 16 and 17, Busse et al. did not expressly disclose wherein the capacitance of the sampling capacitor 26 is less than 10 times and less than 2 times the capacitance of the pixel storage capacitor 2.

Kozlowski disclosed capacitance of the sampling capacitor C_{clamp} (1 fF) is less than 10 times and less than 2 times the capacitance of the pixel storage capacitor (capacitance of detector is 5 to 25 fF)(column 3 line 35, column 5 line 7-8).

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Busse et al. by making capacitance of sampling capacitor less than 2 and less than 10 times the capacitance of the storage capacitor disclosed by Kozlowski for improved signal to noise ratio.

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Re claim 5, Busse et al. disclosed the capacitance of the sampling capacitor is approximately equal to the capacitance of the pixel storage capacitor (column 13 line 19-21).

Re claims 10 and 19, Busse et al. disclosed image sensor wherein the voltage amplifier has a gain.

Busse et al. did not expressly disclose wherein the voltage amplifier has a gain in the range 2 to 5.

Kozlowski (US 6,417,504 B1) disclosed readout circuit for an image sensor wherein amplifier provide a minimum voltage gain from 10 to 30 (column 5 lines 22-24) to mitigate the deleterious reductions in transimpedance resulting from either short integration time or large capacitance (column 6 lines 58-60).

[MPEP. 2144.05. Obviousness of Ranges. OPTIMIZATION OF RANGES. A. Optimization Within Prior Art Conditions or Through Routine Experimentation. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Busse et al. by including an amplifier having gain in the range 2 to 5 obtained through routine experimentation within prior art conditions since Kozlowski disclosed that an amplifier with high gain mitigates the reductions in transimpedance resulting from either short integration time or large capacitance.

Re claim 11, Busse et al. disclosed image sensor 10, wherein the voltage amplifier comprises first 21 and second 23 transistors in series between power lines 22,25, the light sensor

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element 1 being connected to the gate of one of the transistors 21, and a bias voltage 24 being connected to the gate of the other transistor 23, the output of the voltage amplifier being defined at the connection between the first and second transistors 21,23 (Fig. 1).

Re claim 12, Busse et al. disclosed image sensor wherein the output of the voltage amplifier is connected to one terminal of the sampling capacitor 26 the other terminal of the sampling capacitor 26 being connected to the pixel output through an output switch 30 (Fig. 1).

Re claim 13, Busse et al. disclosed image sensor wherein each pixel 10 further comprises an input switch 27 for applying a fixed potential across the light sensor element 1 (Fig. 1).

Re claim 15, Busse et al. disclosed wherein a reset operation is carried out before amplifying the sensor voltage the reset operation comprising applying a known potential 22,25 to one terminal of the sampling capacitor 26 and applying a known potential 9,29 across the sensor element 1, the amplified voltage being subsequently applied to the other terminal of the sampling capacitor 26 (Fig. 1).

Re claim 18, Busse et al. disclosed the capacitance of the sampling capacitor is approximately equal to the capacitance of the pixel storage capacitor (column 13 line 19-21).

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5. Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Busse et al. (US 6,653,636 B2) and Kozlowski (US 6,417,504 B1) in view of Purcell (US 2005/0285960 A1).

Re claims 6 and 9, Busse et al. as modified did not expressly disclose wherein the capacitance of the sampling capacitor 26 is in the range 0.5pF to 3pF, and the capacitance of the pixel storage capacitor 2 is in the range 0.5pF to 3pF.

Purcell disclosed readout circuit for image sensor wherein the capacitance of the first and second sampling capacitor is in the range 0.5pF to 1pF (see Purcell, Claim 16).

[MPEP. 2144.05. Obviousness of Ranges. OPTIMIZATION OF RANGES. A. Optimization Within Prior Art Conditions or Through Routine Experimentation. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify Busse et al. and Kozlowski by selecting capacitance of the sampling capacitor in the range 0.5pF to 3pF, and the capacitance of the pixel storage capacitor in the range 0.5pF to 3pF obtained by Optimization Within Prior Art Conditions or Through Routine Experimentation since Purcell disclosed the general conditions of having sampling capacitors in the 0.5pF to 1pF range.

Conclusion


6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Masuyama (US 2004/0183930 A1) disclosed solid-state image sensing apparatus and driving method wherein a large sampling capacitor having 600 times the gate capacitance is required to minimize the effects of external noise (paragraph 0030).

Jakowatz (US 3,114,884) disclosed filter circuit for recognizing and storing unknown signals wherein the capacitance of the sampling capacitor is less than 10 times and less than 2 times the capacitance of the storage capacitor (ratio of the capacitance of storage capacitor to sampling capacitor capacitance indicated by "n" in Fig. 4).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Anjan K. Deb whose telephone number is 571-272-2228. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew H. Hirshfeld can be reached at (571) 272-2168.



Anjan K. Deb, P.E, Ph.D.

Primary Patent Examiner

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6/20/07

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